



# DIPHTHERIA

1. **Agent:** *Corynebacterium diphtheriae*, a Gram-positive bacillus (Klebs-Loeffler).
2. **Identification:**
  - a. **Symptoms:** An acute disease of pharynx, tonsils, larynx or nose, occasionally other mucous membranes or skin, characterized by an adherent grayish membrane. Symptoms include sore throat, large tender cervical lymph nodes, and marked swelling and edema of neck ("bull neck"). A toxin is responsible for the systemic manifestations. Late effects of the toxin include cranial and peripheral motor and sensory nerve palsies, myocarditis, and nephropathy. Cutaneous diphtheria (wounds, burns) usually appears as a localized ulcer.
  - b. **Differential Diagnosis:** Bacterial and viral pharyngitis, Vincent's angina, infectious mononucleosis, syphilis, and candidiasis.
  - c. **Diagnosis:** Culture of *C. diphtheriae* from nasopharyngeal, throat or membrane swabs.
3. **Incubation:** 2-5 days, occasionally longer.
4. **Reservoir:** Human.
5. **Source:** Discharges from nose, throat, skin, eye and other lesions of infected persons.
6. **Transmission:** Contact with patient or carrier; fomites. Raw milk has served as a vehicle.
7. **Communicability:** Variable until virulent bacilli disappear; usually 2 weeks or less, seldom more than 4 weeks. Effective antibiotic therapy reduces communicability to less than 4 days. Carriers may shed organisms for 6 months or more.
8. **Specific Treatment:**
  - a. **Case:** Diphtheria antitoxin (DAT) should be given on the basis of clinical diagnosis; do not wait for bacteriological confirmation. Currently, the only DAT

available in the U.S. is a product made in Brazil. This product is available to U.S. physicians under an FDA-approved Investigational New Drug (IND) protocol. Physicians requesting DAT should contact the LA County Immunization Program (IP) at 213-351-7800 during normal working hours to arrange for its release from the CDC Quarantine Station at Los Angeles International Airport. After working hours, contact the Administrative Officer of the Day through the County Operator at 213-974-1234.

Appropriate antibiotic therapy with erythromycin or penicillin should be given in conjunction with antitoxin to eradicate the organism and reduce the period of communicability. (Treatment regimens can vary; consultation with infectious disease experts is recommended).

- b. **Carriers:** Appropriate antibiotic therapy as for all primary contacts to case (see section 2. under contacts below).

9. **Immunity:** None.

## REPORTING PROCEDURES

1. Report confirmed or suspected case immediately by telephone (Title 17, Section 2500, *California Code of Regulations*). Call IP during working hours (213-351-7800). After working hours, contact the Administrative Officer of the Day through County Operator (213-974-1234).
2. **Report Form:** **DIPHTHERIA CASE REPORT (CDPH 8579).**
3. **Definitions:**
  - a. **Case:** has an upper respiratory tract illness characterized by sore throat, low-grade fever, and an adherent membrane of the tonsil(s), pharynx, and/or nose, without other apparent cause and is culture positive for virulent *C. diphtheriae*. A patient with a negative culture and classical symptoms may be considered a case.



- b. Contact: has had face-to-face contact to a case within 5 days of case's onset.
- c. Carrier: is an asymptomatic primary contact with positive culture.
- d. Chronic carrier: has been free from the symptoms of diphtheria for 4 weeks or longer and who harbors virulent diphtheria bacilli. Consider as a case.

NOTE: When *C. diphtheriae* or other diphtheroids are seen on smears from colonies, the Laboratory reports this as positive. However, confirmation requires further biochemical studies. The ultimate test of significance is a virulence test.

#### 4. Epidemiologic Data:

- a. Date of onset.
- b. Clinical history, signs and symptoms, nature and location of membrane, history of contact.
- c. Laboratory data.
- d. Immunization history of case: dates, dose, and type.
- e. Identification of household contacts.
- f. Treatment: antitoxin, date, hour, units, route administered, manufacturer. Other medications; dosage dates.
- g. Travel history 2 weeks prior to onset, contact with travelers or immigrants (within incubation period).
- h. Probable source.

### CONTROL OF CASE, CONTACTS & CARRIERS

Public Health Nursing Protocol:  
Home visit is required – a face to face interview is required.

Refer to "Public Health Nursing Home Visit REQUIRED Algorithm" (B-73, [Public Health Nursing Home Visit Protocol](#)).

Immediate investigation required.

### CASE OR SUSPECT:

1. **Isolation**: Strict.
2. Release after 2 negative nose and throat cultures, taken not less than 24 hours apart and at least 24 hours after antibiotic treatment stopped.
3. Isolation may be terminated if bacilli are not virulent (*California Code of Regulations*, Section 2566).
4. If case dies, refer to **Part III, MORTICIANS AND CEMETERIES**.

### CONTACTS:

Persons who have had face-to-face contact to a case within 5 days of case's onset.

1. Members of the family and intimate contacts should be examined, cultured (nose and throat) and, if suspect case has both a positive bacterial culture test result for *Corynebacterium diphtheria*, and clinical symptoms of diphtheria, placed under modified quarantine. (See **Part I, Section 14, Quarantine**.) Area Medical Director notifies Public Health Investigation. All household and close contacts should be given a diphtheria toxoid booster (DTaP, DT, Tdap or Td) as appropriate; see sections 2. and 3. below.
2. A fully immunized person exposed to a case or carrier should be given a booster dose of a preparation containing diphtheria toxoid, if they have not received one within 5 years. Close contacts, regardless of their immunization status, should receive antimicrobial prophylaxis with oral erythromycin (40-50 mg/kg per day in 4 divided doses per day for 7 days, maximum 2 g/day) or a single IM dose of penicillin G benzathine (600,000 U for persons weighing less than 30 kg and 1.2 million U for persons weighing 30 kg or more).
3. All under-immunized contacts (defined as having received less than 3 doses of diphtheria toxoid or whose immunization status is unknown) should be immunized according to the Advisory Committee on Immunization Practice's requirement for their age. They should also receive antibiotic



prophylaxis with oral erythromycin (40-50 mg/kg per day in 4 divided doses per day for 7 days, maximum 2 g/day) or a single IM dose of penicillin G benzathine (600,000 U for persons weighing less than 30 kg and 1.2 million U for persons weighing 30 kg or more).

4. Search for unreported and atypical cases among contacts; restrict and treat.
5. A nurse or physician visits all contacts under quarantine daily to observe and detect suspect cases. Symptomatic contacts are isolated until cultures rule out diphtheria. Begin antitoxin at first signs of illness.
6. Release 7 days after last exposure to case or carrier.
7. Contacts who work in a sensitive occupation and school children should be removed from work or school until adequately prophylaxed as above.

#### CARRIERS:

Routine and Chronic.

1. If carrier is a contact to a virulent case, isolate until carrier's virulence is determined. Carriers with positive virulence should be handled as a case.
2. A carrier with negative virulence or whose contact was to an avirulent case may be treated with antibiotic therapy as for all primary contacts and released after 7 days from case's onset.

#### PREVENTION-EDUCATION

1. Stress importance of routine immunization of all. Immunization required for school entry. California law requires exclusion from school if immunization status does not comply with *California Code of Regulations*, Title 17, regulations.
  - a. An assessment of immunization levels in the community should be initiated. Special outreach clinics and increased health education should be made available to susceptible populations. Immunize high-risk groups including household or intimate contacts, personnel working with

cases or carriers, hospital personnel including nurses and medical students, school contacts.

- b. Primary immunization advised for cases and carriers who have received antitoxin.

2. Use pasteurized milk.

3. Disinfect fomites and discharges from lesions.

#### DIAGNOSTIC PROCEDURES

1. **Culture:** Call Public Health Laboratory, General Bacteriology Section.

**Container:** Bacterial Culturette, or if available, Diphtheria Culture Kit.

#### Laboratory Form: Test Requisition and Report Form H-3021

**Examination Requested:** Diagnosis or release.

**Material:** Nasal, nasopharynx, and throat specimens collected on separate swabs, placed into separate Bacterial Culturettes. For symptomatic cases, material should be obtained from beneath the "adherent membrane", on the pharyngeal tonsillar area of the oral cavity. Portions of the membrane may be collected and submitted in sterile saline. If specimen cannot be transported to Public Health Laboratory within 8 hours, keep cool in refrigerator (do not freeze) until lab pick-up the next day. Ship with a cold pack. Specimens should be transported and received in the PHL within 24 hours of collection.

2. **Virulence Testing:**

- a. Noncutaneous Case: If *C. diphtheriae* is found on cultures of nose or throat specimens, isolate should be sent to the Centers for Disease Control and Prevention (CDC) Laboratory for virulence testing.
- b. Cutaneous Case: Virulence testing is not recommended. Organisms isolated from recent cases of cutaneous diphtheria in the United States have been nontoxigenic.



- c. Carrier: If carrier is a contact to a virulent case, then carrier's specimen should be sent to the CDC Laboratory for virulence testing. Virulence testing is not recommended for specimens obtained from a carrier whose contact was to an avirulent case.